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ABSTRACT

This paper discusses the implications of two studies on the questioning behavior of preservice secondary school science teachers. The first study indicated that preservice teachers could benefit from participation in an instructional procedure designed to enable them to develop skill in several questioning strategies. The second study was designed to determine the time in the undergraduate program at which instruction and practice in questioning should be introduced for maximum effectiveness in the classroom. Results indicated that the students who appeared to profit most from instruction in questioning were those who received the instruction over two quarters, both prior to and concurrent with practice in the classroom. Based upon the findings of these studies several implications for teacher supervisors emerge: (1) instruction relating to questioning techniques given only concurrent with classroom practice may not be sufficient for adequate skill development; (2) in using microteaching techniques, it should not be assumed that skill shown in a microteaching setting will translate to the school classroom; (3) both self-evaluation and evaluation by the supervisor are important components of the instructional sequence; and (4) whenever possible, cooperating teachers should provide models for their student teachers. (JR)

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QUESTIONING SKILL DEVELOPMENT BY PROSPECTIVE SECONDARY SCHOOL SCIENCE TEACHERS: AN EXTENSION

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Introduction

This paper should have a subtitle such as "Implications for Teacher Educators and Other Supervisory Personnel" because implications based on the results of two studies on the questioning behavior of preservice secondary school science teachers will be the major emphasis of this presentation. Some of the findings will be presented but they are not the major focus of this short talk.

Interest in helping preservice secondary school science teachers develop skill in questioning was aroused by supervising a student teacher as she worked with ninth grade life science. Her questions seldom, if ever, required that her students do more than locate the page in the textbook and read the information to her. A doctoral dissertation, completed in 1970, served to determine that preservice teachers could benefit from participation in an instructional procedure designed to enable them to develop skill in three questioning strategies: (1) asking Open Questions, defined to mean questions for which there is more than one acceptable response; (2) pausing at least three seconds after asking a question before either accepting or

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demanding a response; (3) questioning in a manner designed to decrease the amount of teacher talk during a class period.

Results

The dissertation study, which extended over three quarters and involved 42 student teachers, resulted in the findings that the subjects involved in the study were not able to ask Open Questions during their lessons in sufficient numbers to achieve significance (>10 level). They were, however, able to increase the length of their pauses although they did not achieve the criterion length of three seconds. In addition, they could decrease the amount of talking they did as teachers.

A second study was undertaken in an attempt to determine the time in the undergraduate program at which instruction and practice in questioning should be introduced in order to result in maximum effectiveness in the classroom. College juniors rather than student teachers were involved in the second study. The Faculty of Science and Mathematics Education at The Ohio State University has a five quarter undergraduate program which involves work in the schools during all five quarters for science majors.

Two questions served as the foci for the second study: (1) should instruction and practice be provided prior to application or concurrent with application in the classroom and (2) is distributed practice more effective than massed practice in promoting skill development?

The juniors were randomly assigned to three groups for instruction. One group received instruction in questioning during what we call our J-1 quarter when the students are involved in tutorial activities in ninth grade science. The skills emphasized in the questioning program are aimed primarily at conducting class discussions so the one-to-one tutorial relation was assumed to be sufficiently different from leading a discussion via questions to be considered as prior to application in the classroom. A second group received some of the questioning

instruction during the J-1 quarter and the remainder during the J-2 quarter when they were involved in teaching science to small groups of elementary school pupils. The third group received instruction only in the J-2 quarter while working in the elementary schools. All three groups received the same amount and type of instruction.

Data analysis for the second study resulted in the identification of some findings that appear to be of interest to individuals working in the field of teacher education. The group which appeared to profit most from instruction in questioning, in terms of skill development exhibited as the juniors worked in the elementary schools, was the group which had received the instruction distributed over the two quarter period.

Implications for Teacher Education

All of the students involved in the second study on questioning skill development had been pretested in a microteaching situation in which peers served as ninth grade students. Conditions precluded working with real ninth graders. The questioning behaviors exhibited during the work with peers in microteach lessons differed from the questioning used in the elementary schools. The teachers talked more, paused longer, and asked more Open Questions during the microteaching lessons than they did when they were working in the elementary schools. It would seem that if teacher education programs include a microteaching component designed to develop skill in some teaching technique, those in charge of the instruction need to be careful if they assume that skill shown in a microteaching setting will translate to the actual public school classroom, especially if the age variation in the student populations involved is a wide one.

Some teacher education programs are structured in such a manner that instruction and practice in science teaching methodology take place during a block of time carved from the student teaching quarter. Teacher educators need to consider the effectiveness of such an approach if they expect to have their student teachers exhibit these skills with any degree of success during the remainder of the quarter. Based on the findings of the second questioning study, instruction given concurrent with use and only concurrent with use may not be sufficient for adequate skill development. A better approach might be to provide instruction, allow opportunity for practice, apply the technique in the classroom, provide evaluation (self, supervisor), review, and perhaps provide more instruction followed by more practice and use.

Additional techniques or facets of the same skill might be introduced during the second cycle of instruction. Eventually, if the instruction, practice, evaluation, and review are carried out over a period of time longer than several weeks, the preservice teacher should acquire some degree of skill and should be able to apply this skill when he or she is involved in teaching science lessons.

Supervisory personnel should not expect preservice teachers to be solely responsible for evaluating their questioning techniques. Self-evaluation should be an important component of the instructional sequence but evaluation by the supervisor should also be provided.

Classroom teachers who serve as cooperating teachers in preservice programs should provide models for their student teachers if at all possible. If they are unable or unwilling to do this, they should be willing to provide

a supportive atmosphere as the preservice teacher attempts to acquire skill in teaching. This involves providing the freedom which allows the preservice teacher the opportunity to practice, even if success does not always result, and--in science--it means that less emphasis on content coverage and more emphasis on student-student interaction during discussions is necessary.

If science teachers are to promote the growth of students who think about and process information for themselves rather than students who are consumers and repositories of information, teacher educators, inservice teachers and preservice teachers need to work cooperatively in analyzing and developing skill in questioning.